

## High Efficiency Semiconductor Arrays for Hard X-Ray Imaging, Phase I

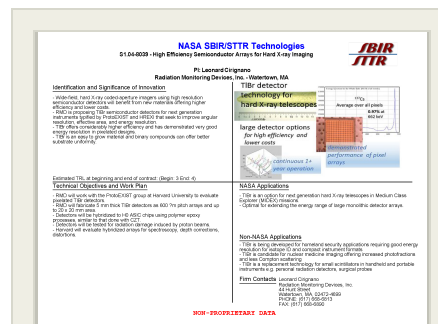
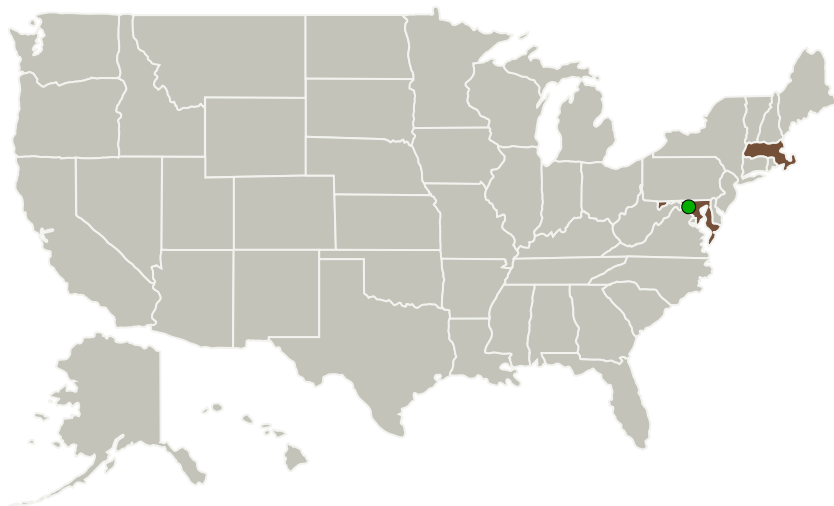


Completed Technology Project (2016 - 2016)

## Project Introduction

The next generation of wide-field survey instruments with improved angular and energy resolution for research into astrophysical transient X-ray phenomena is currently under development. A scalable detector plane architecture has been developed at Harvard using CZT detector arrays for use in high resolution coded-aperture telescopes. Despite decades of research, the yield of device grade CZT is still quite low. In addition, internal defects cause spatial distortions in images. To meet the needs of hard X-ray astronomy a lower cost, more uniform and more readily available alternative to CZT is desirable. Thallium bromide (TlBr) has higher density and atomic number than CZT and therefore higher stopping power at hard X-ray energies. TlBr has a low melting point (460 °C, compared to ~ 1100 °C for CZT) and cubic crystal structure and can be grown from the melt by low cost techniques. As a result, TlBr has the potential to be a more efficient, lower cost alternative to CZT in the detector plane architecture developed by Harvard for use in high resolution coded-aperture telescopes.

## Primary U.S. Work Locations and Key Partners



## High Efficiency Semiconductor Arrays for Hard X-Ray Imaging, Phase I

## Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Images	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

## High Efficiency Semiconductor Arrays for Hard X-Ray Imaging, Phase I



Completed Technology Project (2016 - 2016)

Organizations Performing Work	Role	Type	Location
Radiation Monitoring Devices, Inc.	Lead Organization	Industry	Watertown, Massachusetts
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

## Primary U.S. Work Locations

Maryland	Massachusetts
----------	---------------

## Project Transitions

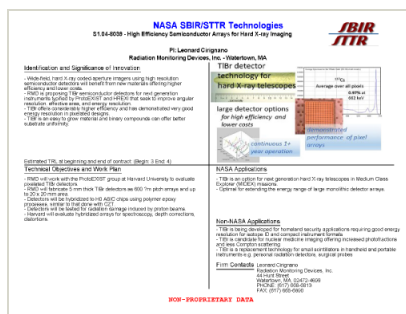
▶ **June 2016:** Project Start

✓ **December 2016:** Closed out

## Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139671>)

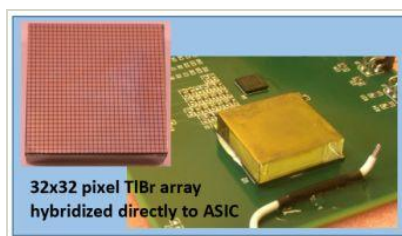
## Images



## Briefing Chart Image

High Efficiency Semiconductor Arrays for Hard X-Ray Imaging, Phase I

(<https://techport.nasa.gov/image/127023>)



## Final Summary Chart Image

High Efficiency Semiconductor Arrays for Hard X-Ray Imaging, Phase I Project Image  
(<https://techport.nasa.gov/image/130207>)

## Organizational Responsibility

## Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

## Lead Organization:

Radiation Monitoring Devices, Inc.

## Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

## Program Director:

Jason L Kessler

## Program Manager:

Carlos Torrez

## Principal Investigator:

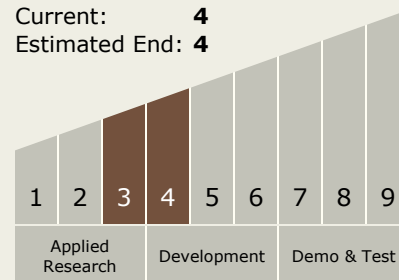
Leonard J Cirignano

## Technology Maturity (TRL)

Start: **3**

Current: **4**

Estimated End: **4**



# High Efficiency Semiconductor Arrays for Hard X-Ray Imaging, Phase I

Completed Technology Project (2016 - 2016)



## Technology Areas

### Primary:

- TX08 Sensors and Instruments
  - └ TX08.3 In-Situ Instruments and Sensors
    - └ TX08.3.1 Field and Particle Detectors

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System